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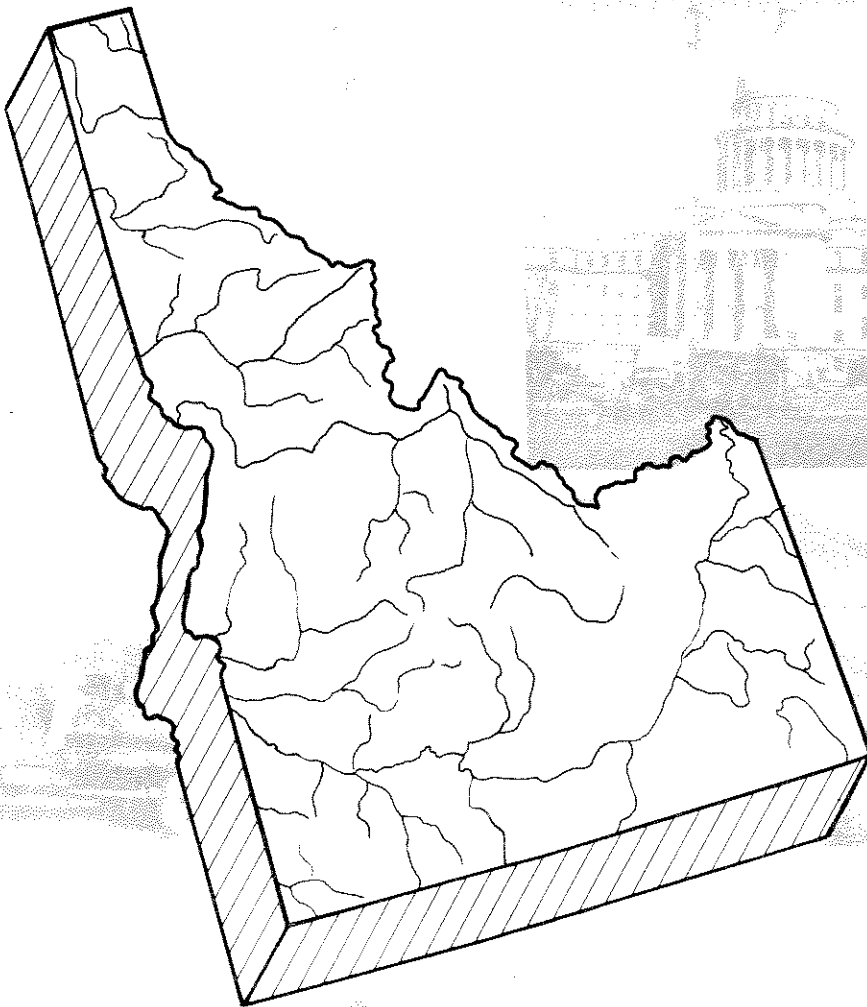
GROUND-WATER

DEVELOPMENT

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IN IDAHO

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GROUND-WATER DEVELOPMENT

IN IDAHO - 1968

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GROUND-WATER DEVELOPMENT IN IDAHO - 1968

PURPOSE AND OBJECTIVES

Ground water is one of Idaho's most important natural resources. A major portion of the agricultural water supply as well as municipal, industrial and domestic supplies are derived from this vast underground resource. The importance of ground-water supplies was emphasized in 1968 by the general shortage of surface supplies. Reservoirs and streams were low and water users turned to wells for a more dependable source of water. This report is the second in an annual series analyzing the development of this resource.

The administration of the ground-water resource of Idaho is the responsibility of the State Reclamation Engineer. This report is prepared to provide him and the public with quantitative information on the location and extent of the present and projected future well development in the state.

The objectives of the study can be divided into four headings:

1. Determine the rate of development of the ground-water resource in the state during 1968.
2. Determine the pattern of ground-water development in the state during 1968.
3. Compare the data collected in 1968 with that collected in 1967 to determine any trends in development.
4. Estimate where ground-water development will occur in future years.

ANALYSIS OF DATA

Ground-water development in Idaho in 1968 was analyzed using two sources of information: well drillers' reports submitted for wells drilled in 1968 and applications approved for the appropriation of ground water during the year. Estimates of future development were based on the comparison of the 1967 and 1968 data. The estimates do not include assessments of hydrologic capabilities or water rights administration.

Information from well drillers' reports was compiled by hydrologic area or drainage basin (fig. 1). This information included the date the well was completed, the diameter of the well, and the depth of the well. A summation of the data from the well drillers' reports is present in Table 1 for each hydrologic area.

Well drillers' reports have been submitted for 1,365 wells drilled during 1968 (fig. 2). These wells have an average diameter of 8.0 inches and an average depth of 194 feet. The additional well drillers' reports, submitted for wells drilled in 1967 after the 1967 report was published, have been added to the values presented in that report. The revised information on well construction during 1967 indicate that 802 wells were drilled with an average diameter of 8.7 inches and an average depth of 183 feet. These data indicate a 70% increase in the number of wells reported drilled during 1968 over those reported drilled during 1967. The total number of well drillers' reports are not final as additional reports will be submitted for 1967 and 1968 during 1969, despite a state law requiring that the reports must be submitted within 30 days of the completion of the well. The 70% increase in the number of reports submitted in 1968 is probably the combined result of increased cooperation by the well drillers

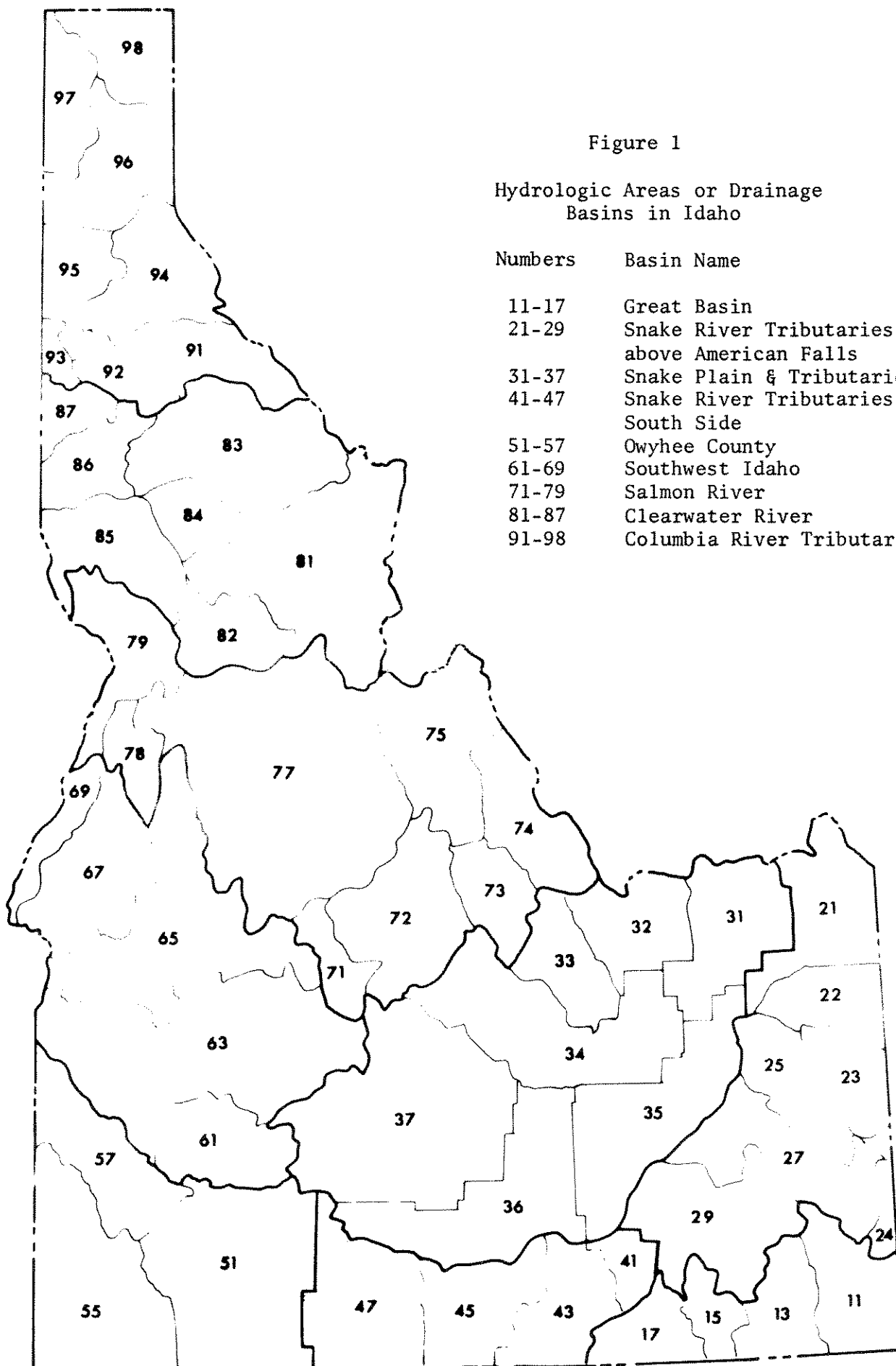
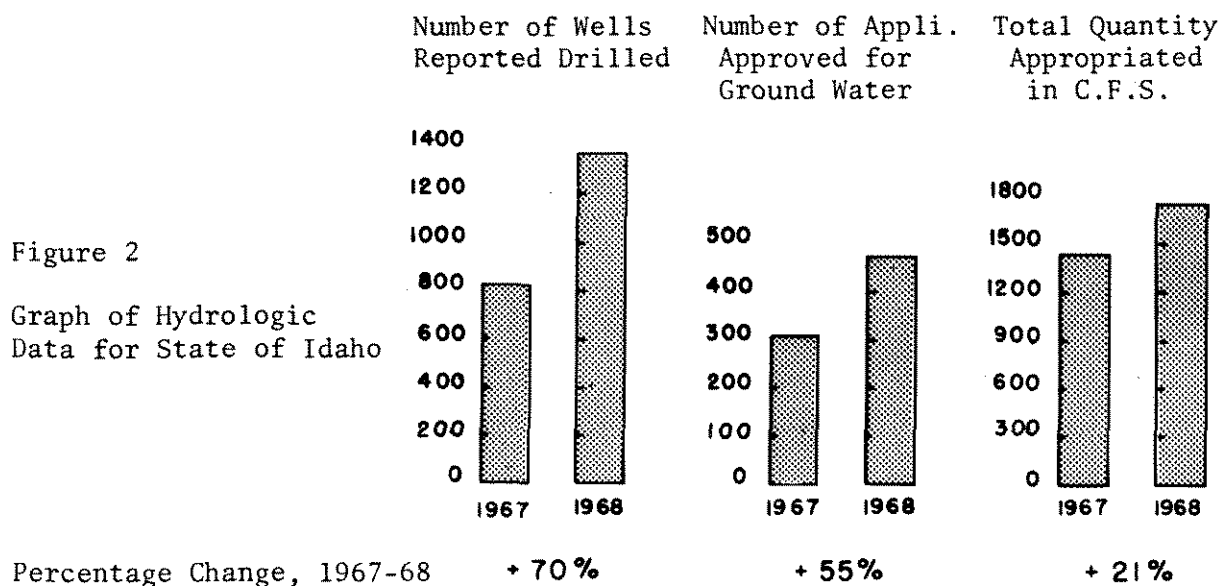


Figure 1

Hydrologic Areas or Drainage Basins in Idaho

Numbers	Basin Name
11-17	Great Basin
21-29	Snake River Tributaries above American Falls
31-37	Snake Plain & Tributaries
41-47	Snake River Tributaries - South Side
51-57	Owyhee County
61-69	Southwest Idaho
71-79	Salmon River
81-87	Clearwater River
91-98	Columbia River Tributaries

Figure 2
Graph of Hydrologic
Data for State of Idaho



and increased well drilling activity in the state. However, it may be concluded that development of water supplies from ground water is continuing, possibly at an increased rate.

Information from applications submitted to appropriate ground water has been compiled by hydrologic area and is presented in Table 1. The data presented include the number of filings, the total quantity appropriated and the average quantity appropriated for each hydrologic area and the state.

The State Reclamation Engineer approved four hundred and seventy-four applications to appropriate ground water in Idaho during 1968 (fig. 2). The number of applications to appropriate ground water approved during the year is an indication of future development of the resource. A permit must now be filed with the Department of Reclamation prior to the commencement of drilling of a well. The applicant has five years to complete the construction of his well and submit to the department proof of beneficial use of the water. The application thus indicates locations where new wells

may be drilled within the near future.

The 474 applications approved during 1968 are a 55% increase over 1967, when 305 applications were approved. This increase can partially be attributed to the dry period that occurred from 1967 through 1968. A second factor that probably influenced the large increase in filings is the increasing interest in filing an application for a domestic use of ground water. The Idaho Code specifically exempts domestic wells from having to follow the permit system. However, in areas of ground-water conflict or possible conflict, many domestic water users have chosen to file an application and thus record the necessary information with the Department of Reclamation. This trend is shown by the decrease in average quantity approved for application from 4.7 c.f.s. (cubic feet per second) in 1967 to 3.7 c.f.s. in 1968.

A brief discussion of ground-water development throughout the state is presented in the following sections. The state is divided into major drainage basins for this discussion (fig. 1).

Great Basin (Areas 11-17)

The ground water development in the Great Basin (see fig. 1) includes only a small portion of the state total (fig. 3). The 1968 development slowed from the 1967 rate; the number of wells reported drilled and the number of approved applications both decreased. Most of the wells reported drilled in the Great Basin in Idaho were 6 inches in diameter, indicating a predominant interest in domestic wells. The primary area for irrigation development is No. 17, direct drainage to the Great Salt Lake (see fig. 1).

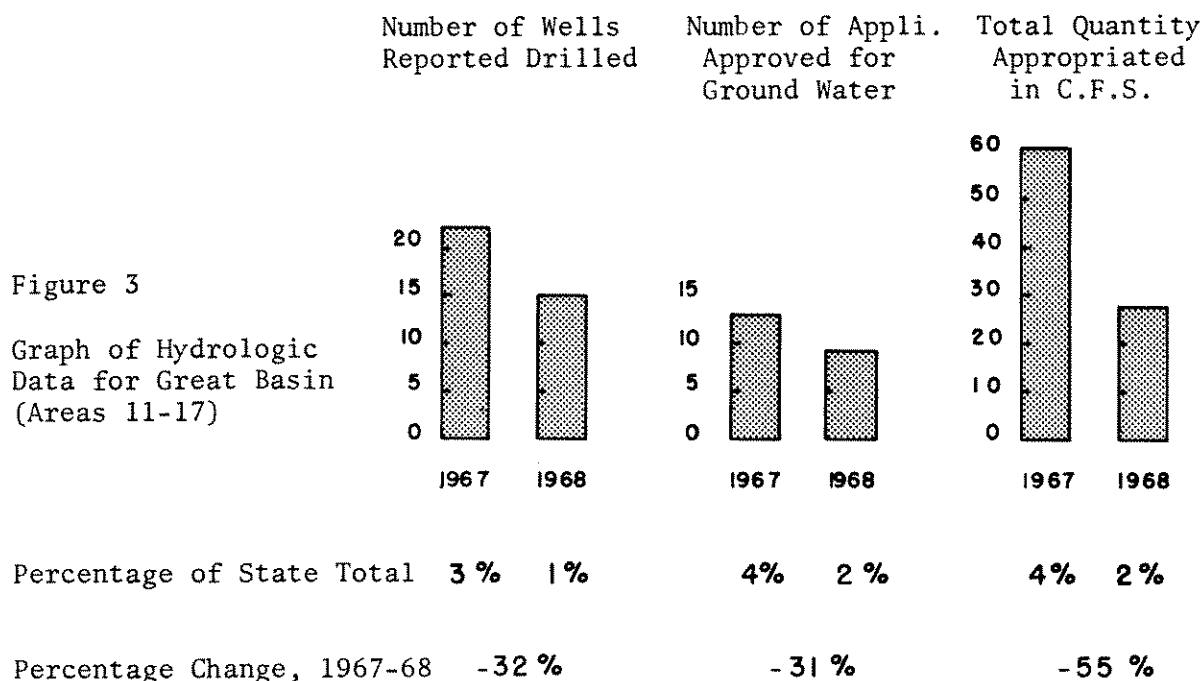
A significant change in well development in the Great Basin areas in Idaho is not expected to occur in 1969. The primary interest in ground

TABLE 1
HYDROLOGIC DATA - 1968

Area Number	Hydrologic Area	Number of Wells Reported Drilled in 1968	Average Diameter (inches)	Average Depth (feet)	Number of Applications Submitted for Ground Water 1968	Total Quantity Appropriated (cfs)	Average Quantity Appropriated (cfs)
11-17	Great Basin	15	7.5	131	9	27.2	3.0
11	Bear River above Alexander	9	6.4	107	2	4.3	2.2
13	Bear River - Alexander to State Line	4	7.3	171	1	.1	.1
15	Malad River	0	0	0	2	1.1	.6
17	Great Salt Lake	2	13.0	160	4	21.7	5.4
21-29	Snake River Tributaries above American Falls	179	8.4	170	31	94.8	3.1
21	Henrys Fork	27	8.4	177	6	14.5	2.4
22	Teton River	32	9.3	232	6	33.2	5.5
23	Snake River Tributaries above Heise	0	0	0	1	0	0
24	Salt River	3	6.0	55	0	0	0
25	Willow Creek	19	7.4	218	2	6.5	3.3
27	Blackfoot River	52	7.9	98	4	15.7	3.9
29	Portneuf River	46	9.0	192	12	24.9	2.1
31-37	Snake Plain and Tributaries	211	7.7	209	141	654.1	4.6
31	Camas Creek and Mud Lake	12	15.8	264	9	42.5	4.7
32	Medicine Lodge and Birch Creeks	3	20.0	490	3	15.8	5.3
33	Little Lost River	4	14.0	192	7	39.6	5.7
34	Big Lost River and N.R.T.S.	7	12.3	173	6	48.3	8.1
35	Aberdeen-Springfield	63	9.6	204	55	202.6	3.7
36	Minidoka-Jerome	56	10.2	276	36	150.3	4.2
37	Wood Rivers	66	7.2	164	25	155.0	6.2
41-47	Snake River Tributaries - South Side	140	8.6	279	40	205.3	5.1
41	Rock Creek	1	6.0	115	0	0	0
43	Raft River	26	10.4	307	2	6.9	3.5
45	Goose Creek - Rock Creek	41	8.6	284	10	60.5	6.1
47	Salmon Falls Creek	72	7.9	269	28	137.9	4.9
51-57	Owyhee County	38	10.1	566	44	216.9	4.9
51	Bruneau River	15	12.4	733	25	129.5	5.2
55	Owyhee River	2	11.0	454	2	17.6	8.8
57	Snake River Tributaries - Grandview to Homedale	21	8.3	457	17	69.8	4.1

61-69	Southwest Idaho	553	7.7	161	172	488.6	2.8
61	Mountain Home	50	10.9	336	37	188.9	5.1
63	Boise River	368	7.1	163	110	247.6	2.3
65	Payette River	120	8.2	86	13	33.5	2.6
67	Weiser River	15	8.5	138	12	18.6	1.6
69	Snake River Tributaries - Weiser to Grande Ronde River	0	0	0	0	0	0
71-79	Salmon River	46	6.6	94	6	12.9	2.2
71	Stanley Basin	5	6.4	59	0	0	0
72	Salmon River - Stanley to Ellis	3	6.0	44	1	.2	.2
73	Pahsimeroi River	4	11.0	152	2	10.0	5.0
74	Lemhi River	6	6.0	59	1	2.6	2.6
75	Salmon River - Ellis to Middle Fork	13	6.0	47	1	.1	.1
77	Salmon River - Middle Fork and South Fork to Riggins	0	0	0	0	0	0
78	Little Salmon River	9	6.7	81	1	0	0
79	Salmon River - Riggins to Mouth and Snake River Tributaries - Grande Ronde to Salmon River	6	6.0	260	0	0	0
81-87	Clearwater River	95	7.8	218	7	4.1	.6
81	Middle Fork	4	6.0	95	0	0	0
82	South Fork	5	7.6	138	0	0	0
83	North Fork	1	8.0	205	0	0	0
84	Main Stem and Tributaries - Kooskia to Ahsahka	10	6.6	119	1	.7	.7
85	Camas Prairie - Lewiston	41	6.5	230	2	.9	1.5
86	Potlatch River	13	7.1	279	1	.1	.1
87	Palouse River	21	7.1	251	3	.3	.1
91-98	Columbia River Tributaries	88	8.2	160	24	25.4	1.1
91	St. Joe River	4	7.0	90	0	0	0
92	St. Maries River	10	5.6	93	0	0	0
93	Spokane River Tributaries	1	6.0	300	0	0	0
94	Coeur d'Alene River	9	7.5	149	4	2.9	.7
95	Lake Coeur d'Alene - Rathdrum Prairie	39	8.7	194	13	14.9	1.1
96	Pend Oreille	23	8.0	151	5	7.5	1.5
97	Priest River	1	34.0	69	2	.1	0
98	Kootenai River	1	6.0	60	0	0	0
	Total State	1,365	8.0	194	474	1,733.8	3.7

Figure 3
Graph of Hydrologic
Data for Great Basin
(Areas 11-17)



water will continue to be for small irrigation and domestic purposes.

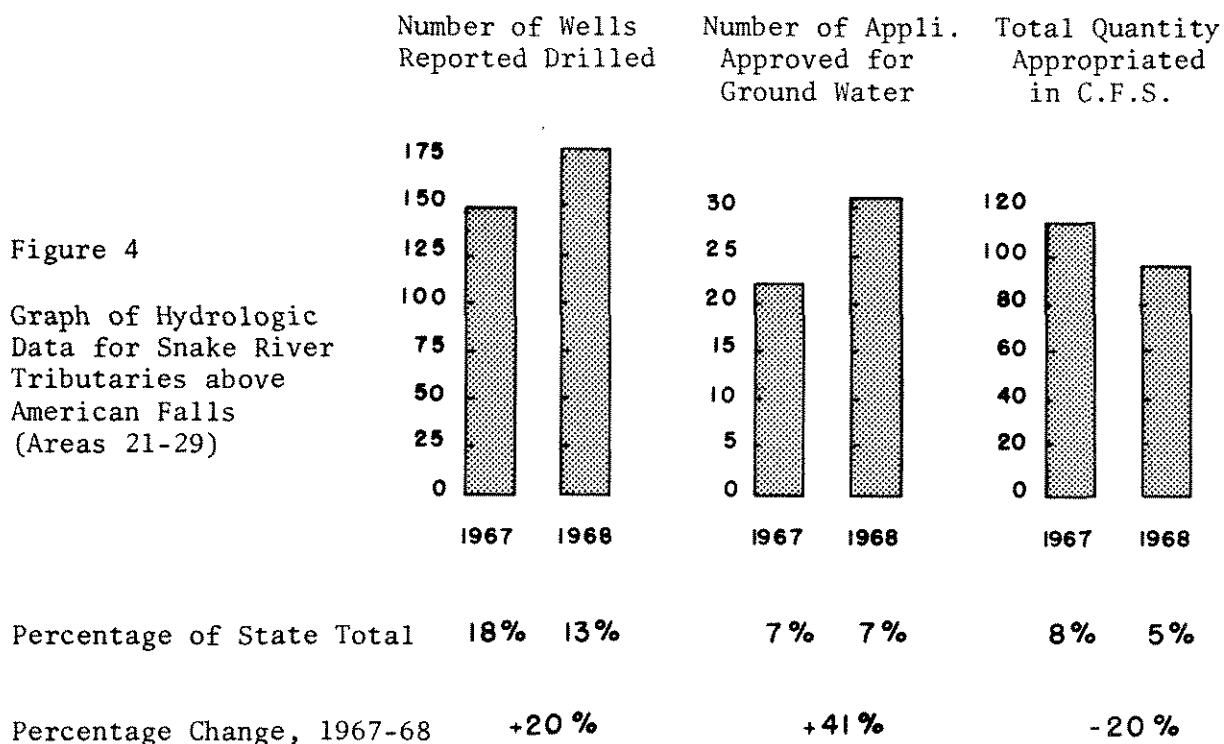
Snake River Tributaries above American Falls

(Areas 21-29)

The development of ground water for irrigation and domestic supplies increased in the area included in the Snake River tributaries above American Falls (see fig. 1 for location) (fig. 4). Although the number of applications approved to appropriate ground water increased from 1967 to 1968, the total quantity appropriated in areas 21-29 decreased during the same period. The decrease in the average quantity of water approved per application indicates a significant increase in interest in small irrigation or domestic uses. A large part of the increased number of filings was the result of the increased interest in area 21, Henrys Fork region. The average diameter of wells reported drilled remained approximately the same in 1968 as in 1967. The total number of wells reported drilled

Figure 4

Graph of Hydrologic
Data for Snake River
Tributaries above
American Falls
(Areas 21-29)



increased during the year, although at a rate below the state average.

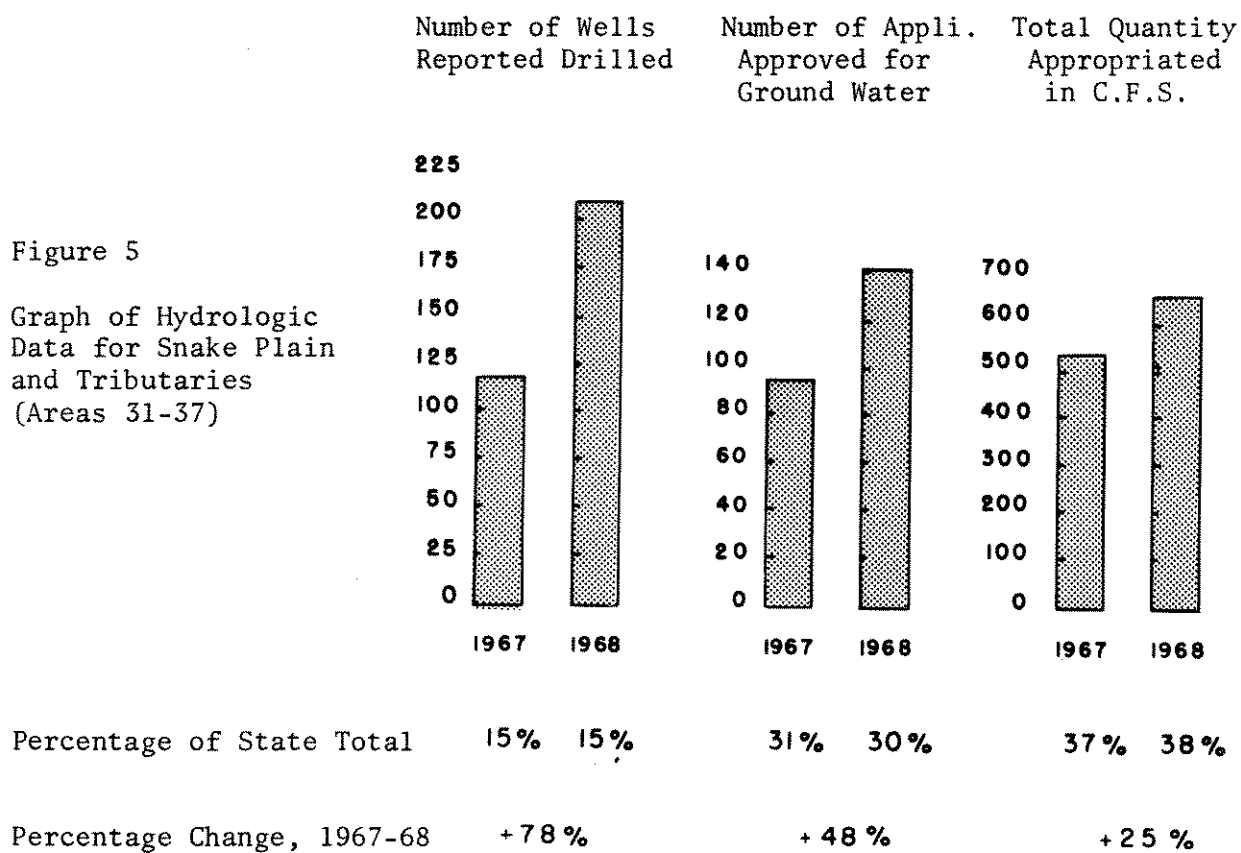
The development of ground water in the upper Snake River Basin will probably continue to increase in 1969. The emphasis in development will continue to change to greater domestic and small irrigation uses. Areas 27 and 29, the Blackfoot and Portneuf River basins, will probably continue to be the centers for new irrigation development, while the Henrys Fork (21) and Teton River (22) regions will continue to develop small irrigation and domestic supplies.

Snake Plain and Tributaries (Areas 31-37)

The Snake Plain and tributaries area (31-37) includes the greatest potential for irrigation development of the ground-water resource in the state (fig. 1). The rate of development of the resource during 1967-68 was approximately the same as the state average (fig. 5).

Figure 5

Graph of Hydrologic
Data for Snake Plain
and Tributaries
(Areas 31-37)



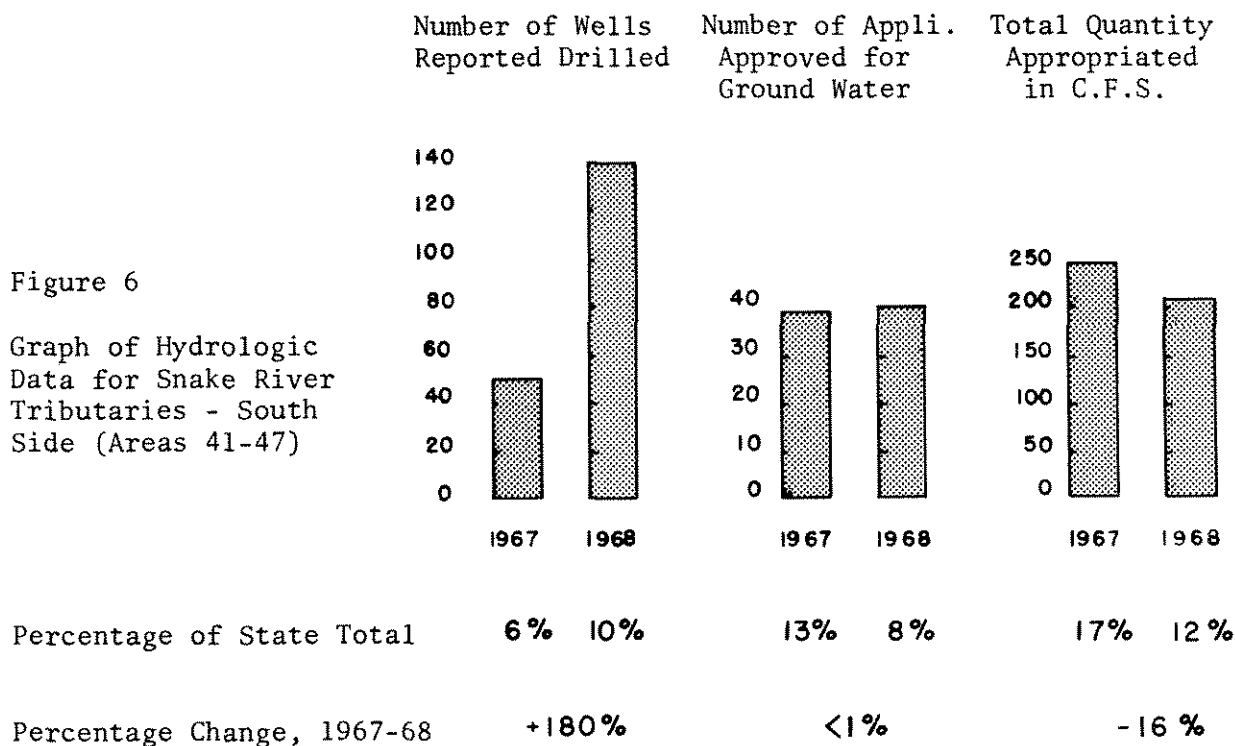
Most of the ground-water development in the Snake Plain and tributaries area occurred in the southern portion of the Snake Plain. Area 35, Aberdeen-Springfield, had a large increase in approved applications in the period of 1967-68 but only a small increase in total quantity appropriated. The area also has an increase in the number of wells reported drilled but a decrease in average diameter. The development of ground water has thus changed in scope in the area; more interest is expressed in small irrigation projects and domestic uses. Area 37, Wood Rivers, had a large increase in ground-water development in 1968, as compared in 1967. Both the number of applications approved and wells reported drilled increased by more than three fold. The average quantity appropriated was one of the highest in

the state. Most of the new irrigation filings were in the Big Wood-Silver Creek area and the Camas Prairie southeast of Fairfield. Many of the wells drilled in area 37 in 1968 were for domestic purposes in the Big Wood Valley near Ketchum. These wells were drilled for the many new summer homes in the area. The northern portion of the Snake Plain and tributaries area did not experience the large increase in ground-water development noted in the areas to the south.

The southern portion of the area included in the Snake Plain and tributaries will continue to be the center for the ground-water development. The Aberdeen-Springfield (35), Minidoka-Jerome (36) and Wood Rivers (37) areas will have both large scale irrigation development as new lands on the plain are opened and smaller scale irrigation and domestic development as the population increases. The remainder of the Snake Plain and tributaries area is not expected to undergo any large changes in rate of development or emphasis.

Snake River Tributaries - South Side (Areas 41-47)

The area included in the Snake River tributaries - south side (41-47) did not undergo an increase in applications approved to divert ground water in 1967-68 but did have an increase in wells reported drilled (fig. 6). The number of applications approved remained approximately the same while the total quantity appropriated declined somewhat. The decrease in average quantity appropriated indicated a trend toward smaller irrigation and domestic uses. The center of new well development changed from Goose Creek-Rock Creek area (45) to the Salmon Falls Creek area (47). The latter area also had a large increase in wells reported drilled. Most of these wells were located near Twin Falls and were for small irrigation and domestic



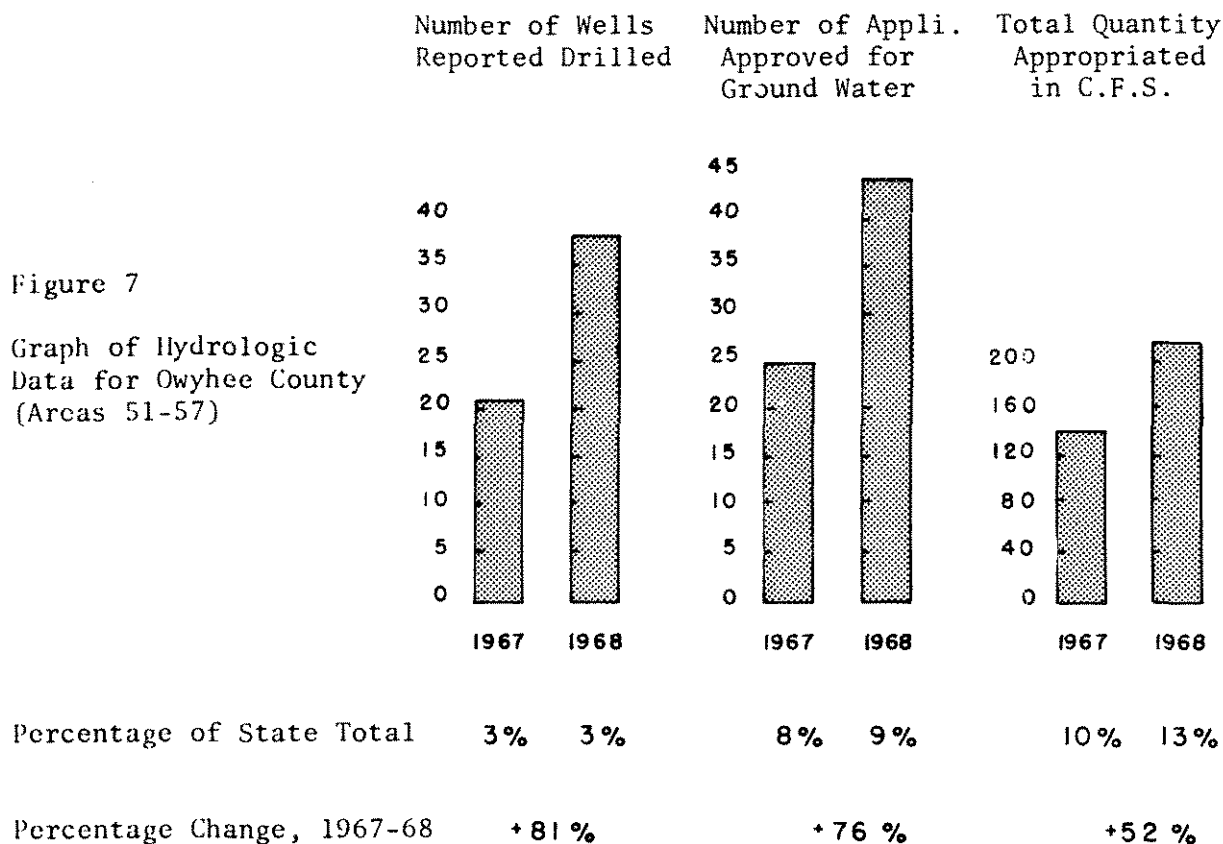
purposes.

Portions of the Goose Creek-Rock Creek area (45) and almost all of the Raft River area (43) are presently declared critical ground-water areas. The only purposes for which wells may be drilled in these areas are domestic and replacement. The effect of these closures are noted in the small number of filings from these rich agricultural areas.

The ground-water development in the area included in the Snake River tributaries - south side (41-47) is expected to remain fairly stable in 1969. The emphasis in development will probably continue to be centered in the Salmon Falls area (47) and that part of the Goose Creek-Rock Creek area (45) omitted from the critical designation.

Owyhee County (Areas 51-57)

Development of the ground-water resources in Owyhee County increased during the period 1967-68 at about the same rate as the state average



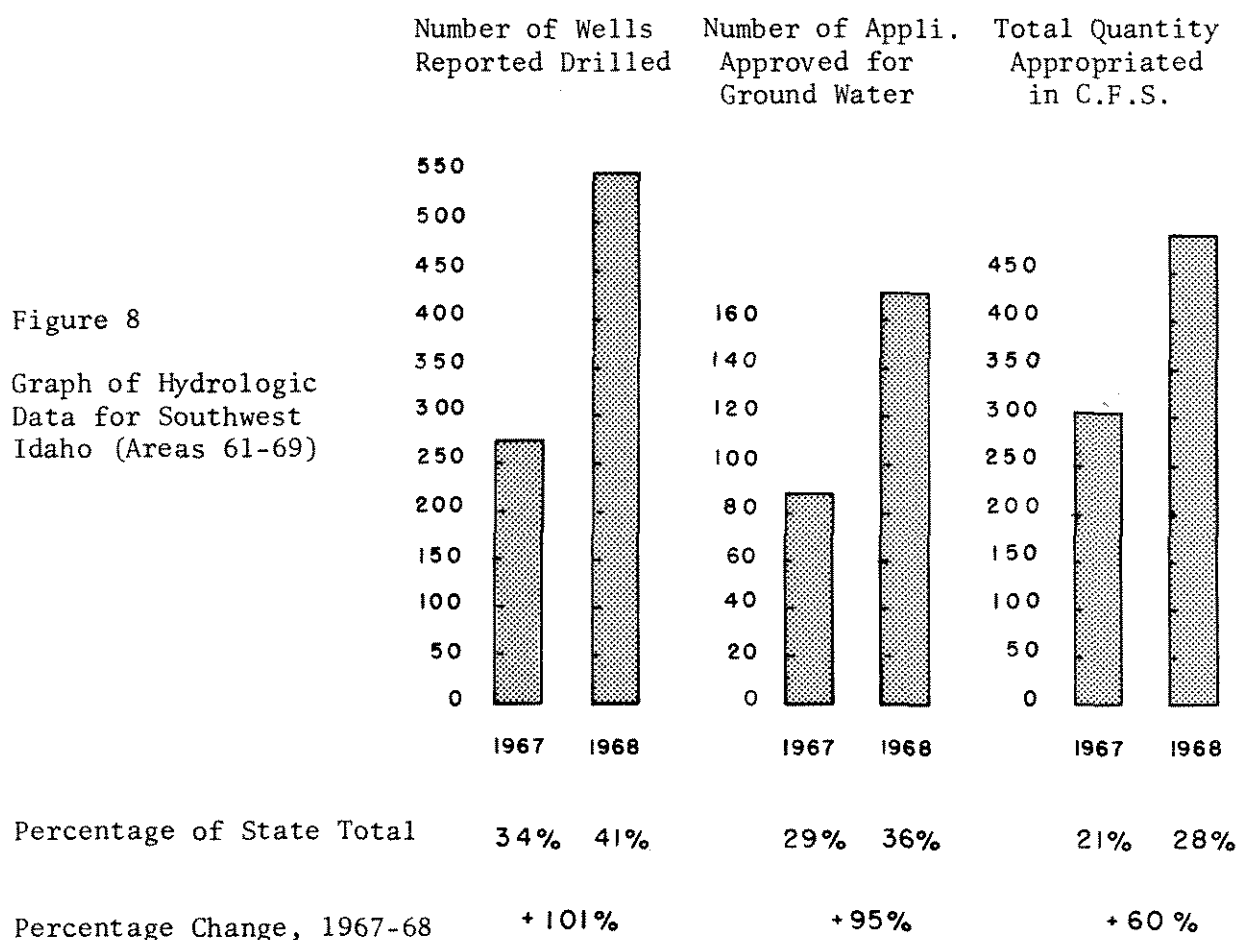
(fig. 7). The area accounts for only a minor percentage of the wells reported drilled but approximately 10 percent of the applications approved and total quantity appropriated. The large average diameter of wells reported drilled and large average appropriation indicates a continuing interest in large irrigation uses.

Ground-water development in Owyhee County is expected to remain at or near the rate noted in 1968. New lands will continue to be opened for irrigation.

Southwest Idaho (Areas 61-69)

Southwest Idaho was the most active area of ground-water development in the state in 1968 (fig. 8). Over one-third of both the applications

Figure 8
Graph of Hydrologic
Data for Southwest
Idaho (Areas 61-69)



approved and wells reported drilled in the state were for this area. The development in 1968 in southwest Idaho is about double that in 1967. The principal areas of activity are Boise River (63), Payette River (65) and Mountain Home (61). Over 60 percent of the ground-water development in southwest Idaho was in the Boise River area (63). The small average diameter of wells reported drilled and small average appropriation indicate a marked interest in small irrigation and domestic filings. This new interest in ground-water development is believed to be predominantly the result of urbanization. More people are building homes near the Boise-Nampa-Caldwell areas and drilling small wells for domestic and

small irrigation purposes. Interest in large scale irrigation is also continuing, although somewhat overshadowed by the smaller filings. The irrigation development in the Boise River area (63) is centered in southern Ada and Canyon counties.

The Payette River area (65) had the second greatest number of wells reported drilled of any area in the state in both 1967 and 1968, yet only a small number of applications approved in either year. Most of the ground-water development in this area is for small irrigation and domestic purposes. The number of applications approved and wells reported drilled in the Mountain Home area (61) more than doubled in the period 1967-68. The primary emphasis in this area is for irrigation development.

Southwest Idaho area (61-69) is expected to be the most active area for ground-water development in the state during the next few years. The primary interest will be in small irrigation and domestic projects with some large irrigation in the Mountain Home (61) and Boise (63) areas.

Salmon River (Areas 71-79)

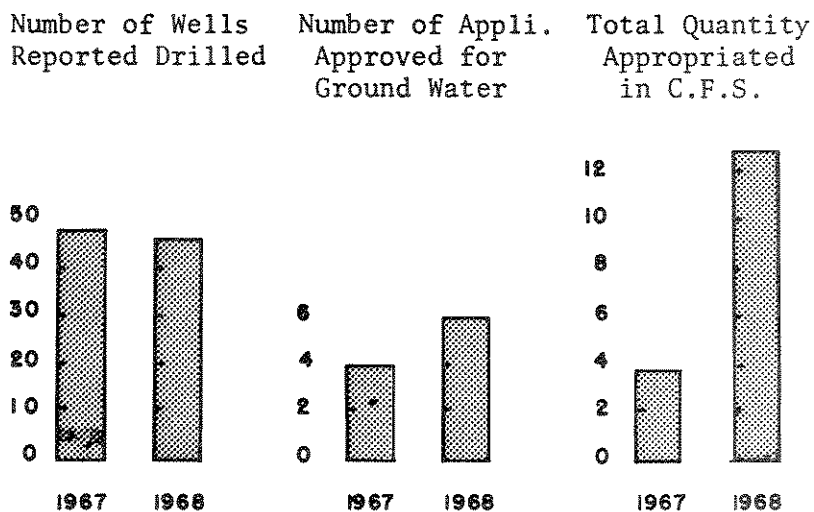
Only a small percentage of the total ground-water development in the state takes place in the Salmon River drainage (fig. 9). Most of the well development is for small irrigation and domestic purposes. The same general level of ground-water development that has occurred in the area in 1967 and 1968 is expected to continue into the near future.

Clearwater River (Areas 81-87)

The ground-water development in the Clearwater River basin is very similar to that in the Salmon River discussed above (fig. 10). The primary emphasis for development is for small irrigation and domestic purposes.

Figure 9

Graph of Hydrologic
Data for Salmon River
(Areas 71-79)



Percentage of State Total 6% 3%

1% 1%

<1% 1%

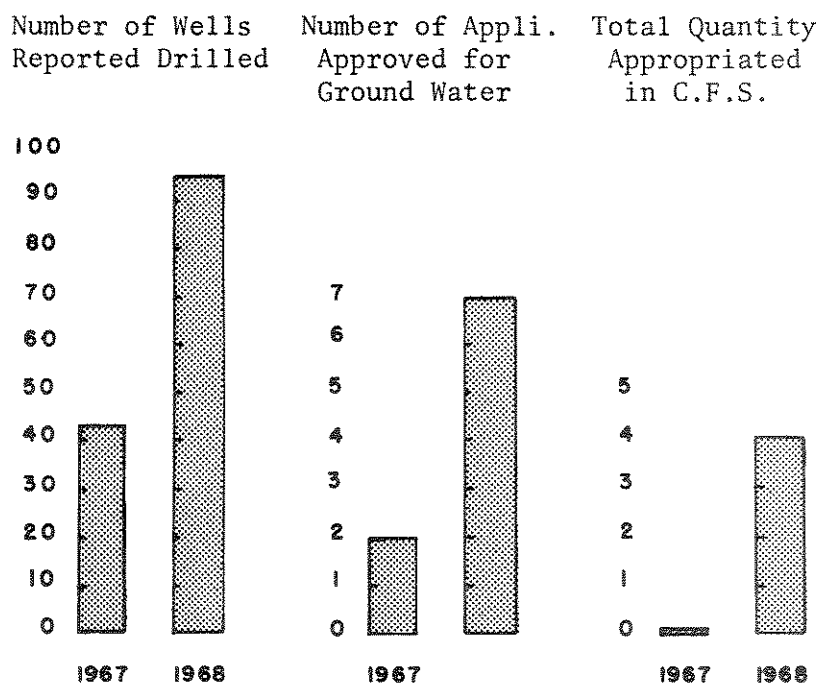
Percentage Change, 1967-68 4%

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Figure 10

Graph of Hydrologic
Data for Clearwater
River (Areas 81-87)



Percentage of State Total 5% 7%

1% 1%

<1% <1%

Percentage Change, 1967-68 +12%

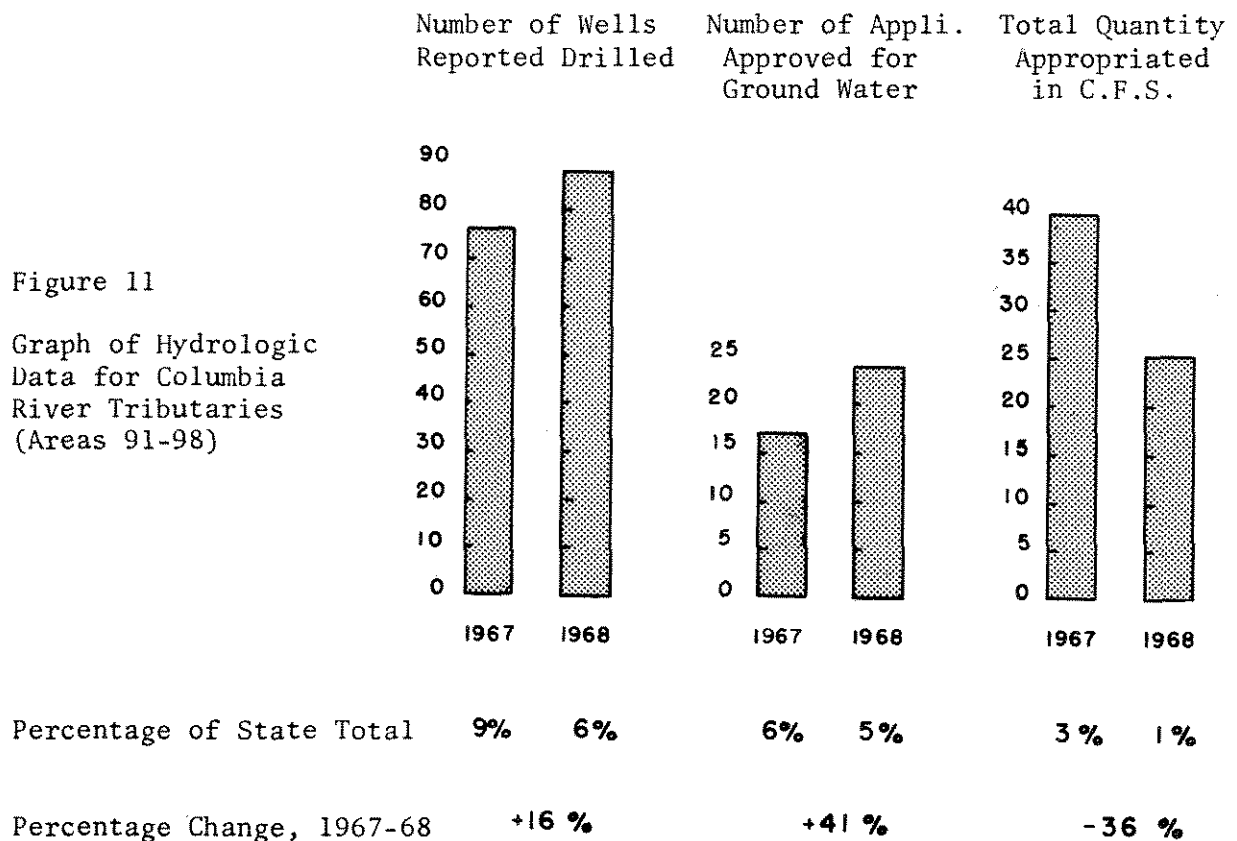
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The large increase in wells reported drilled in the period 1967-68 was in part the result of increased drilling activity in the Camas Prairie-Lewiston area (85). The small average diameter of wells reports drilled in this area indicates the emphasis on smaller projects. The future ground-water development in the Clearwater River area (81-87) will continue in the same pattern as noted in 1967 and 1968. The centers of future development will coincide with population centers.

Columbia River Tributaries (Areas 91-98)

The primary change in ground-water development in the Columbia River tributaries area (91-98) in extreme northern Idaho is a trend toward smaller irrigation and domestic uses of the resource (fig. 11). The number of wells reported drilled and applications approved both increased in the area in



1967-68, but the total quantity appropriated decreased. The future development of the ground-water resource in the Columbia River tributaries will continue with the same emphasis as in 1967-68. The potential area for large scale irrigation in northern Idaho is Rathdrum Prairie (95).

DISCUSSION OF RESULTS

The areal distribution of applications approved to appropriate ground water in Idaho in 1968 is presented in figure 12. Two-thirds of the applications are in two southern Idaho areas: the Snake Plain and tributaries (31-37) and the Boise River (61-69). The size of the average approved application in these areas indicate that large scale irrigation is the primary emphasis in the Snake Plain area while small scale irrigation and domestic uses are the primary emphasis in the Boise River area. The northern three basins of the state accounted for about 8% of the total number of applications but less than 3% of the total quantity of water appropriated. The percentages of total applications and total quantity appropriated for each area are presented in Table 2 for 1967 and 1968. These data may be used to compare the ground-water development in any of the areas to the state total. The ratios presented in Table 2 may be interpreted to represent the general interest of the area with respect to the state average. Ratios greater than one indicate a greater interest in small irrigation and domestic developments; ratios less than one indicate predominant agricultural areas. The 1967 data indicate that all of southern Idaho with the exception of southwestern Idaho area (61-69) and Great Basin drainage (11-17) have a predominant agricultural interest. The 1968 data, however, indicate a change in emphasis in the upper Snake River tributaries area (21-29). This trend is expected to continue as new lands to develop

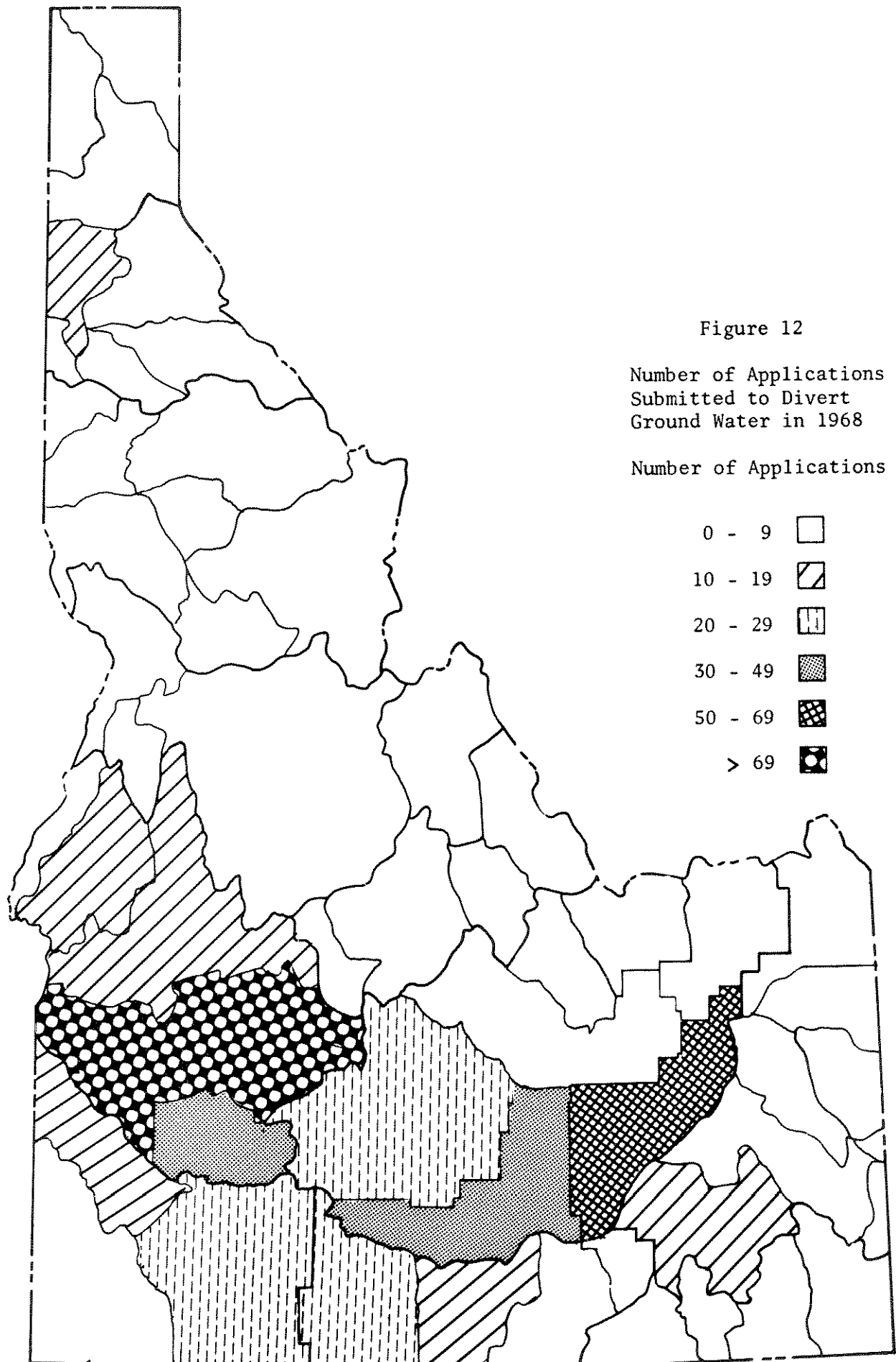


TABLE 2
Approved Applications and Total Appropriations in
Percent of State Total by Hydrologic Basins, 1967-68

		<u>1967</u>			<u>1968</u>		
		A	B	A/B	A	B	A/B
		Approved Appli. %	Total Approp. %	Ratio	Approved Appli. %	Total Approp. %	Ratio
11-17	Great Basin	4	4	1.00	2	2	1.00
21-29	Snake River Tributaries above American Falls	7	8	0.88	7	5	1.40
31-37	Snake Plain and Tributaries	31	37	0.84	30	38	0.79
41-47	Snake River Tribu- taries - South Side	13	17	0.76	8	12	0.67
51-57	Owyhee County	8	10	0.80	9	12	0.75
61-69	Southwest Idaho	29	21	1.38	36	28	1.28
71-79	Salmon River	1	0(<1)	<1	1	1	1.00
81-87	Clearwater River	1	0(<1)	<1	2	0(<1)	<1
91-98	Columbia River Tribu- taries	6	3	2.00	5	2	2.50

become more scarce and the population increases.

The areal distribution of the number of wells reported drilled in 1968 (fig. 13) indicates the center of the development in in southwestern Idaho. This distribution is largely the result of the large number of small irrigation and domestic wells drilled near the population centers. The relationship of domestic to irrigation wells is illustrated by a graph of the diameter of wells reported drilled in 1968 (fig. 14). Over 55% of the wells reported drilled in the state in 1968 were 6 inches in

diameter. The next most common well diameter, 8 inches, included approximately 16 percent of the wells reported drilled. The bar graph of well diameters presented in figure 14 is very similar to that reported for 1967. The average diameter decreased slightly from 8.7 inches to 8.0 inches in 1968. If it is assumed that 8-inch and smaller wells are used for domestic and small irrigation purposes and 10-inch and larger wells for major irrigation, the ratio of these types of wells was about 3.5 to 1 in 1968.

The percentages of total wells reported drilled in each basin are presented in Table 3 for 1967 and 1968. Four basins received a lower percentage of the reported drilled wells in 1968 than 1967; two basins reported

TABLE 3

Wells Reported Drilled by Hydrologic

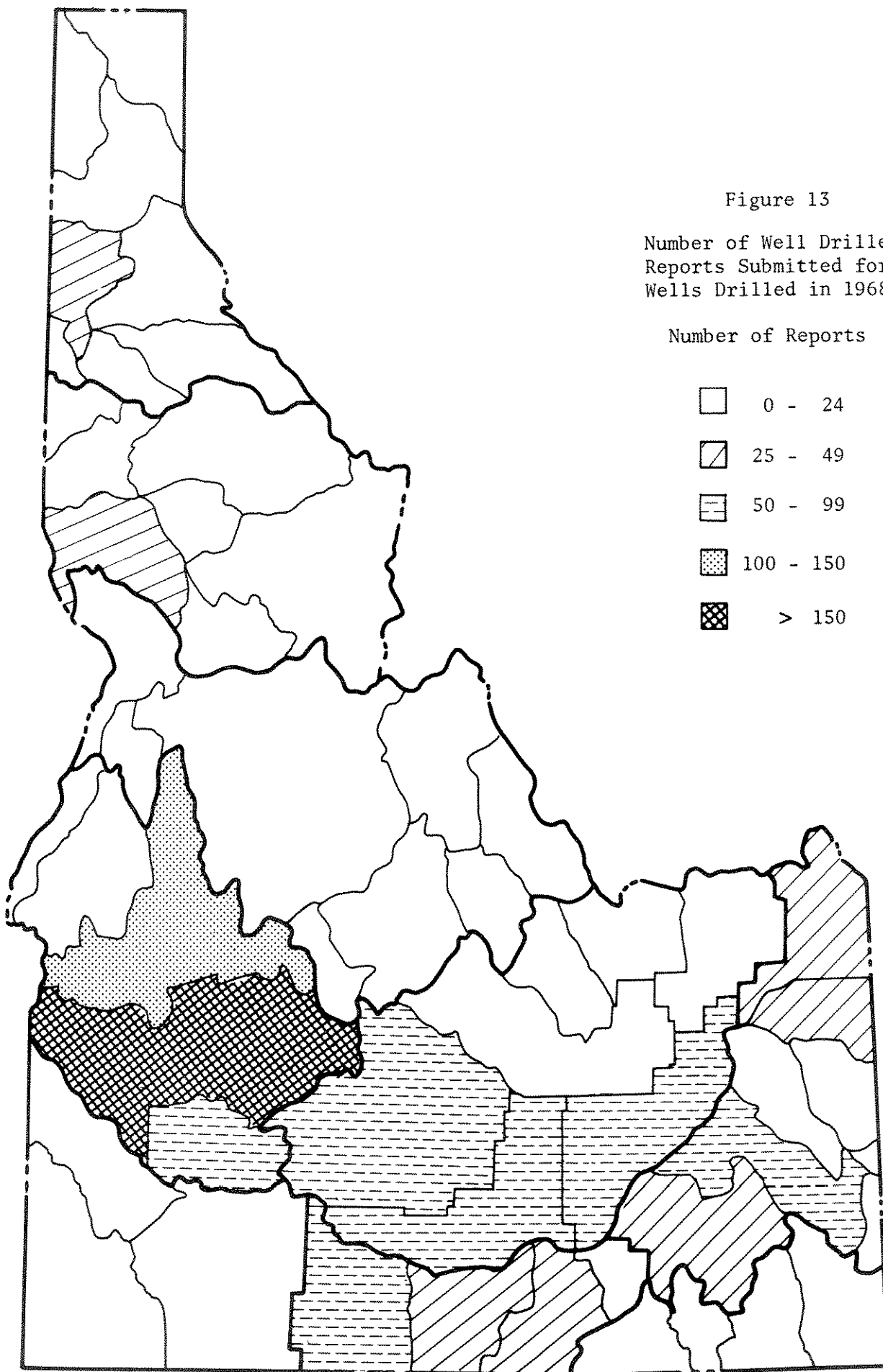
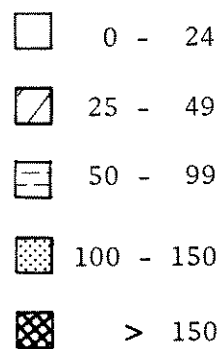
Basin in Percent of State Total, 1967-68

Hydrologic Basin	Wells Reported Drilled as percent of State Total	
	<u>1967</u>	<u>1968</u>
11-17 Great Basin	3	1
21-29 Snake River Tributaries above American Falls	18	12
31-37 Snake Plain and Tributaries	15	15
41-47 Snake River Tributaries - South Side	6	11
51-57 Owyhee County	3	3
61-69 Southwest Idaho	34	41
71-79 Salmon River	6	3
81-87 Clearwater River	5	7
91-98 Columbia River Tributaries	10	7

Figure 13

Number of Well Drillers'
Reports Submitted for
Wells Drilled in 1968

Number of Reports



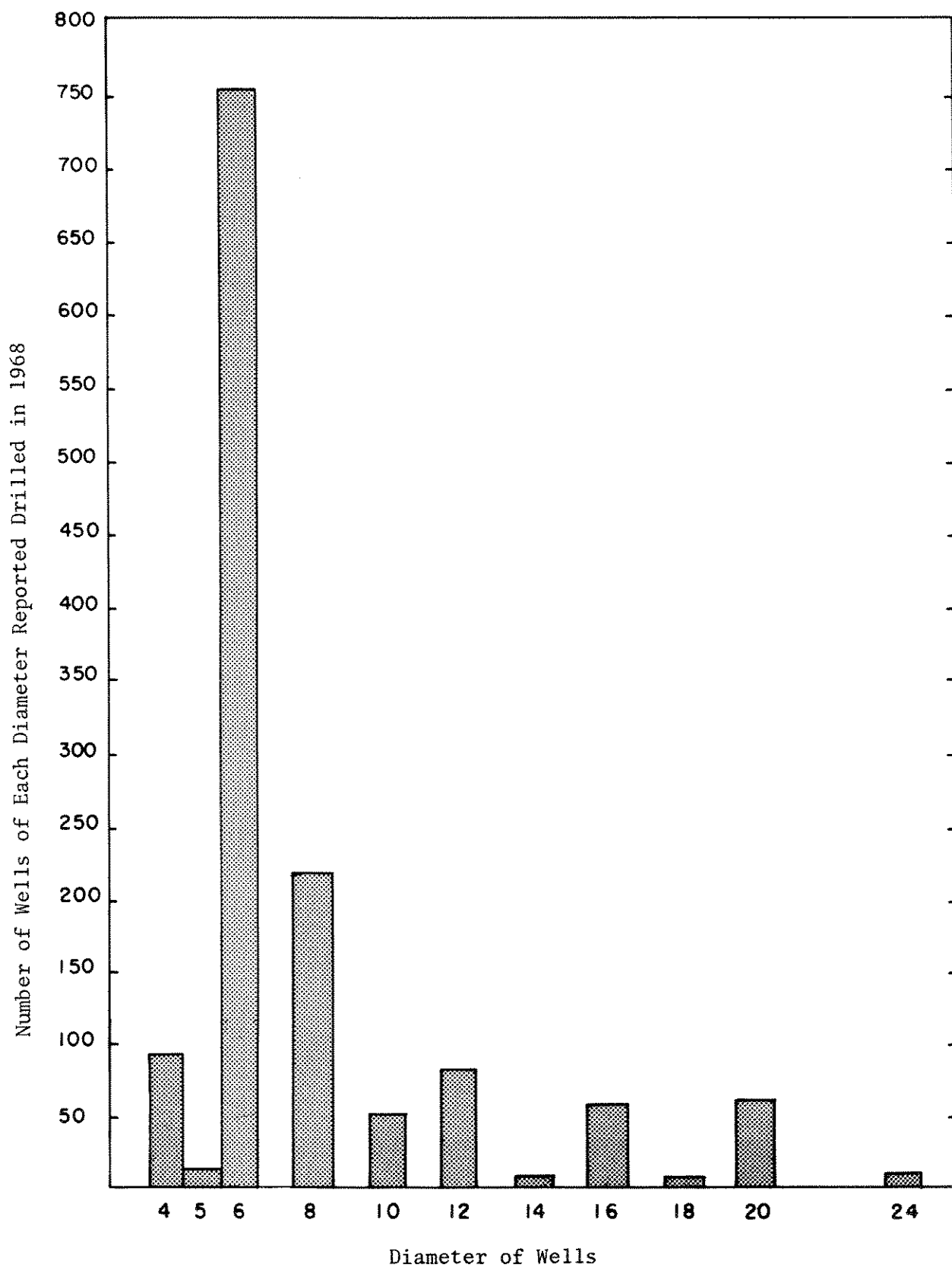


Figure 14

Number and Diameter of Wells Reported Drilled in 1968

less wells drilled. The area of greatest increase in wells reported drilled was southwest Idaho (61-69).

CONCLUSIONS

Ground-water development in Idaho increased in activity in 1968 with 55% more applications approved to appropriate ground water and 70% more wells reported drilled than in 1967. A large portion of the increase in filings was the result of small irrigation or domestic filings. An unknown portion of the increased number of wells reported drilled in 1968 was the result of increased cooperation by the well drillers of the state.

The Boise River area (63) was the center of ground-water development in the state, in both applications approved and wells reported drilled. The south Snake Plain areas, Aberdeen-Springfield (35), Minidoka-Jerome (36), and Wood River (37), are also important areas with respect to the ultimate ground-water development of the state. These areas included about one-third of the total quantity appropriated in 1968 and are located on the very productive Snake Plain aquifer. The Wood River (37) area had the largest increase in ground-water development in the state. Other areas of the state that had important activity in ground-water development include Salmon Falls Creek (47), Mountain Home (61), and Payette River (65).

The ground water development in 1969 will be centered in southern Idaho, in the same general pattern as the 1968 development. Southwest Idaho will undergo even greater increase in well development as the urban influence continues. The agricultural growth will be influenced by decisions concerning desert land entries and by the general availability of surface water. As in 1968, the most important new large well developments should occur on or near the Snake Plain.